

February 4, 1974

Memo to: John Glynn, Stew Messman.

From: Pat Lee

Subject: Efficiency Survey at Burlington STP.



An efficiency survey was conducted at Burlington STP on January 9, 1974. The influent and effluent were composited on the half hour after comminutation and before chlorination respectively for eight hours. The plant grounds were neat but the facilities showed their age. All parts of the plant were operating but not at peak efficiency. The media in the trickling filter was a dull brown color and there was short circuiting in the chlorine contact chamber. The short circuit was caused by the influent to the chamber flowing under a retaining wall and out the effluent without flowing through the chamber itself.

The field and laboratory results (summarized on the efficiency study form) show the Burlington plant to be overloaded as it is not providing the treatment a secondary plant should. Neither the BOD or the suspended solids in the effluent will meet the new EPA requirements. I collected four coliforms out of the effluent from the contact chamber and each of these showed excellent disinfection. The last two I collected, I sampled from the manhole on the effluent line just before the line leaves the plant property, and these both showed much higher counts than the other four. Whether these were fluke results or part of the plant is being by passed should be investigated.

PML:jmh

STP SURVEY REPORT FORM

(EFFICIENCY STUDY)
Trickling

City Burlington Plant Type Filter Population 3000 Design 1800
Served Capacity
Receiving Water Skagit River Engineer Stew Messman
Date 1/9/74 Survey Period 0830-1630 Survey Personnel Pat Lee
Comp. Sampling Frequency half hour Weather Conditions Sunny but cold.
(last 48 hours)
Sampling Alequot 1000 ml. / half hour

PLANT OPERATION

Total Flow 225,000 gallons in 8 hours How Measured pumping time
Max. (Flow) --- Time of Max. --- Min. --- Time of Min. ---
Pre Cl₂ 0 #/day Post Cl₂ 20 #/day

FIELD RESULTS

	Influent				Effluent			
8 Determinations	Max.	Min.	Mean	Median	Max.	Min.	Mean	Median
Temp. °C	12.8	10.2	---	12.5	11.6	8.4	---	11.2
pH	7.2	6.7	---	7.0	7.3	6.9	---	7.0
Conductivity (umhos/cm)	650	500	563	550	750	500	671	700
Settleable Solids	11.0	7.0	9.4	10.0	0.6	0.1	0.3	0.3

LABORATORY RESULTS ON COMPOSITE IN PPM

Laboratory Number	Influent	Effluent	% Reduction
	74-0050	74-0051	
5-Day BOD	158	41	74%
COD	420	120	71%
T.S.	487	302	38%
T.N.V.S.	220	192	13%
T.S.S.	264	120	54%
N.V.S.S.	81	62	23%
pH	7.3	7.4	
Conductivity	530	520	
Turbidity	125	35	

Burlington

BACTERIOLOGICAL RESULTS

Na₂S₂O₃ added to sample before sampling after _____ min.

LAB #	SAMPLING TIME	COLONIES/100 MLS (MF)		Cl Residual	
		Total	Fecal	ppm	(after secs.)
74-0052	0930	1500	20	>1.0	180 *
53	1030	20	<10	>1.0	" *
54	1130	<20	10	>1.0	" *
55	1230	420	10	>1.0	" *
56	1330	>40,000	>4000	0	" **
57	1530	>40,000	>4000	.4	" **

Operator's Name Jacob Van Putten Phone # 755-3393 or 955-5094Comments: Nutrients in effluent as ppmNO₃-N = .86NO₂-N = .04NH₃-N = .21T-Kjeldahl-N = .21O-PO₄-P = 1.00T-PO₄-P = 7.40

* Sampled after contact chamber.
 ** Sampled at manhole.

DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

DATA SUMMARY

COPIES TO:
.....
.....
.....
LAB FILES.....

Source BURLINGTON STP

Collected By P.L.S.

Date Collected 1-9-74

Goal, Pro./Obj. _____

Log Number:	74-	0050	51	52	53	54	55	56	57		STORET
Station:	1NF	EFF	0930	1030	1130	1230	1330	1530			
pH	7.3	7.4									00403
Turbidity (JTU)	125.	36.									00070
Conductivity (umhos/cm)@25°C	530.	520.									00095
COD	420.	120.									00340
BOD (5 day)	159.	41.									00310
Total Coliform (Col./100ml)	-	-	1500	20 EST	<20	420	>4110 ⁴	>4110 ⁴			31504
Fecal Coliform (Col./100ml)	-	-	20 EST	<10	10 EST	10 EST	>4000	>4000			31616
NO3-N (Filtered)	-	.86									00620
NO2-N (Filtered)	-	.04									00615
NH3-N (Unfiltered)	-	21.									00610
T. Kjeldahl-N (Unfiltered)	-	21.									00625
O-PO4-P (Filtered)	-	1.00									00671
Total Phos.-P (Unfiltered)	-	7.40									00665
Total Solids	487.	302.									00500
Total Non Vol. Solids	220.	192.									
Total Suspended Solids	264.	120.									00530
Total Sus. Non Vol. Solids	91.	62.									
Chlorides	30	23									

Note: All results are in PPM unless otherwise specified. ND is "None Detected"
Convert those marked with a * to PPB (PPM X 10³) prior to entry into STORET

Summary By L. P. R. H. Date 1-25-74

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SEWAGE TREATMENT PLANT OPERATION AND MAINTENANCE
PRACTICES QUESTIONNAIRE

FORM APPROVED
BUDGET BUREAU NO. 42-11527

CHECK ONE: <input checked="" type="checkbox"/> 1ST AUDIT <input type="checkbox"/> RE-AUDIT	DATE OF AUDIT <u>1/9/74</u>	PLANT DESCRIPTION CODE (For Official Use Only) <u>Trickling Filter</u>
-----------------------------------------------------------------------------------------------	--------------------------------	---------------------------------------------------------------------------

A. GENERAL INFORMATION	
1. PROJECT (State, Number) <u>Washington</u>	SCOPE OF PROJECT (new plant, additions, etc.) <u>Routine</u>
2. PLANT LOCATION (City, county) <u>Burlington Skagit</u>	IDENTIFICATION OF AREAS SERVED <u>Burlington</u>

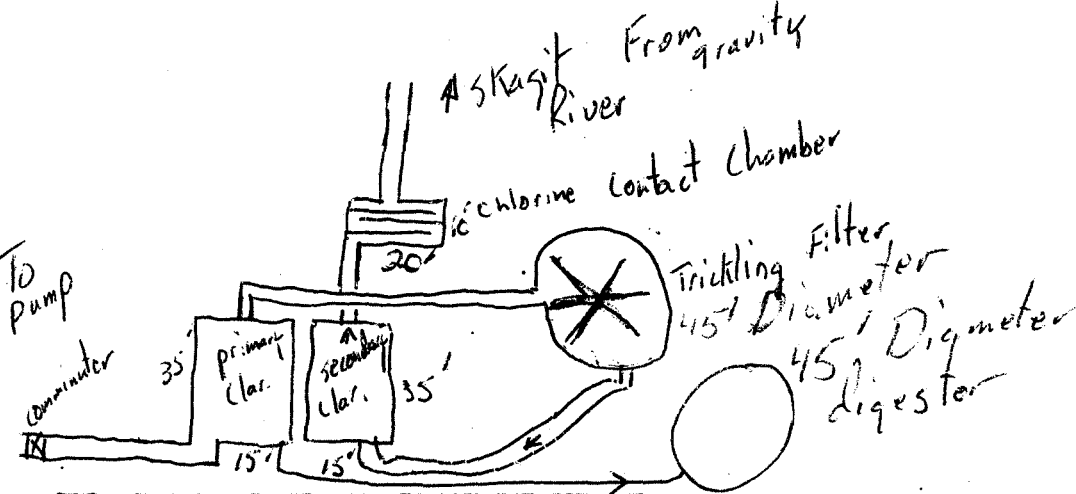
3A. FRACTION OF AREA POPULATION SERVED (%) <u>98</u>	3B. PLANT DESIGN (population equivalent) <u>1300</u>	3C. SERVED BY PLANT (domestic) <u>3000</u>
---------------------------------------------------------	---------------------------------------------------------	-----------------------------------------------

4. TYPE OF COLLECTION SYSTEM		4B. ESTIMATE FLOW CONTRIBUTED BY SURFACE OR GROUND WATER (infiltration, mgd) <u>Sometimes .5 to 1</u>
4A. <input type="checkbox"/> COMBINED <input checked="" type="checkbox"/> SEPARATE <input type="checkbox"/> BOTH		

5. YEAR COMMUNITY BEGAN SEWAGE TREATMENT <u>1947</u>	6. YEAR PRESENT SYSTEM PLACED IN OPERATION		
	6A. SEWER <u>1947</u>	6B. PLANT <u>1947</u>	6C. ANCILLARY WORKS

7A. SIZE OF PLANT SITE (acres) <u>2</u>	7B. APPROXIMATE AREA LEFT FOR EXPANSION (acres) <u>0</u>
--------------------------------------------	-------------------------------------------------------------

8A. IN THE SPACE PROVIDED BELOW FURNISH A SIMPLIFIED FLOW DIAGRAM OR A WRITTEN DESCRIPTION OF THE PLANT UNITS IN FLOW SEQUENCE. INCLUDE THE METHOD OF ULTIMATE SLUDGE DISPOSAL. SHOW APPROXIMATE SURFACE AREA OF STABILIZATION PONDS AND NUMBER OF CELLS. INDICATE WHETHER FLOW TO AND FROM PLANT IS BY PUMPING OR GRAVITY.



8B. NOTE ANY SIGNIFICANT OR UNIQUE PROCESSING CONDITIONS.

9. RECEIVING STREAM	
9A. NAME OF STREAM <u>Skagit River</u>	
9B. STREAM FLOW IS <input checked="" type="checkbox"/> PERENNIAL <input type="checkbox"/> INTERMITTENT <input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> REGULATED	<input checked="" type="checkbox"/> INTERSTATE <input type="checkbox"/> INTRASTATE <input type="checkbox"/> COASTAL

B. CURRENT PERFORMANCE AND PLANT LOADING INFORMATION			
1A. ANNUAL AVERAGE DAILY FLOW RATE (mgd) <u>0.6</u>	1B. PEAK FLOW RATE (mgd) DRY WEATHER <u>0.6</u> WET WEATHER <u>1.5</u>	1C. MINIMUM FLOW RATE (mgd) <u>0.3</u>	
2. AVERAGE BOD OF RAW SEWAGE (5 DAY 20°C) (ppm)	3. AVERAGE SETTLEABLE SOLIDS OF RAW SEWAGE (mg/l)		
4. AVERAGE SUSPENDED SOLIDS OF RAW SEWAGE (mg/l)	5. AVERAGE COLIFORM DENSITY OF RAW SEWAGE (mpn/100 ml)		

5. ANNUAL AVERAGE PLANT PERFORMANCE			
5A. BOD (%)	5B. SETTLEABLE SOLIDS (%) <u>99</u>	5C. SUSPENDED SOLIDS (%)	5D. COLIFORM DENSITY (%)

7A. DOES PLANT HAVE STANDBY POWER GENERATOR FOR MAJOR PUMPING FACILITIES? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	7B. ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
8. ARE CHLORINATION FACILITIES PROVIDED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, ANSWER 8A THRU G	IF YES, IS CHLORINATION CONTINUOUS? <input type="checkbox"/> YES <input type="checkbox"/> NO IF NO, EXPLAIN REASON FOR INTERMITTENT CHLORINATION

8A. PURPOSE OF CHLORINATION

Disinfection

8D. TYPE OF CHLORINATOR

Wallace + Tiernan V-Notch

8C. POINT OF APPLICATION OF CHLORINE

before contact chamber

8D. CAN BYPASSED SEWAGE BE CHLORINATED?

☒ YES ☐ NO

8E. AVERAGE FEED RATE OF CHLORINE (lb/day)

20

8F. CHLORINE RESIDUAL IN EFFLUENT

>1.0 PPM AT END OF 5 MINUTES

8G. MINIMUM SUPPLY OF CHLORINE STORED ON PREMISES (lb)

3 tanks 225 lbs

9. ARE FACILITIES PROVIDED FOR COMPLETE BYPASS OF RAW SEWAGE?

☒ YES ☐ NO

IF YES, ANSWER A THRU G BELOW, ANSWER H IN EITHER CASE.

9A. FREQUENCY (times monthly)

9B. AVERAGE DURATION (hours)

9C. REASON FOR BYPASSING

9D. ESTIMATED FLOW RATE DURING BYPASS IS

☐ WITHIN HYDRAULIC CAPACITY OF PLANT
☐ BEYOND HYDRAULIC CAPACITY OF PLANT BY

9E. DOES SEWAGE OVERFLOW IN DRY WEATHER?

☐ YES ☒ NO

9F. TYPE OF DIVERSION STRUCTURE

9G. AGENCIES NOTIFIED OF BYPASS ACTION

9H. DO OPERATORS HAVE OPTION TO BYPASS INDIVIDUAL PLANT UNITS? (If no, has this caused any operational problems?)

☐ YES ☐ NO

10A. ARE BACK FLOW DEVICES PROVIDED AT ALL CONNECTIONS TO CITY WATER SUPPLY? (If no, explain)

☒ YES ☐ NO

10B. CHECK TYPE OF BACK FLOW PREVENTION DEVICE

☒ DOUBLE CHECK VALVE ☐ PRESSURE OPERATED ☐ PHYSICAL DISCONNECT ☐ OTHER(specify)

11. USES OF TREATMENT PLANT EFFLUENT

none

12. USES OF RECEIVING STREAM WITHIN 10 MILES OF OUTFALL

recreation

13. HAVE THERE BEEN ANY ODOR COMPLAINTS BEYOND THE PLANT PROPERTY? (If yes, explain)

☐ YES ☒ NO

14. OBSERVED APPEARANCE AND CONDITION OF EFFLUENT, RECEIVING STREAM, OR DRAINAGE WAY

15. STABILIZATION POND

A. WEEDS CUT AND VEGETATIVE GROWTH IN POND ELIMINATED?

☐ YES ☐ NO

D. BANKS AND DIKES MAINTAINED (erosion etc.)?

☐ YES ☐ NO

C. FENCING AND WEARING - POLLUTED WATER? SIGNS PRESENT AND IN GOOD REPAIR?

☐ YES ☐ NO

E. FREQUENCY OF INSPECTION BY OPERATOR

E. WATER DEPTH (feet)

_____ HIGH _____ LOW _____ MEDIUM

F. ADEQUATE CONTROL OF DEPTH?

☐ YES ☐ NO

G. SEEPAGE REPORTED?

☐ YES ☐ NO

H. ANY REPORTS OF GROUND WATER CONTAMINATION FROM POND (If yes, give details)?

☐ YES ☐ NO

I. MOSQUITO BREEDING PROBLEM?

☐ YES ☐ NO

IF YES, NAME OF SPECIES IF KNOWN

J. CAN SURFACE RUN-OFF ENTER POND?

☐ YES ☐ NO

C. SUPERVISORY SERVICES

1. IS A CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATING AND MAINTENANCE PROBLEMS?

☒ YES ☐ NO IF YES IS IT ON: ☒ CONTINUING BASIS OR ☐ UPON REQUEST BASIS

IF CONTINUING BASIS, WHAT IS THE FREQUENCY OF VISITS:

2. DO OPERATORS AND OTHER PERSONNEL ROUTINELY ATTEND SHORT COURSES, SCHOOLS OR OTHER TRAINING ACTIVITIES?

☒ YES ☐ NO

IF YES, CITE COURSE SPONSOR AND DATE OF LAST COURSE ATTENDED

IF NO, DO YOU KNOW OF ANY COURSES AVAILABLE TO SERVE THIS AREA?

3A. ARE ALL EQUIPMENT AND PARTS OF THE PRESENT PLANT STILL IN OPERATION?

☒ YES ☐ NO (If no, explain)

B. ARE PROCESSING UNITS OPERATING AT DESIGN EFFICIENCY?

☐ YES ☒ NO (If no, explain)

overloaded

4. HAVE THERE BEEN ANY DIFFICULTIES WITH THE SEWAGE TREATMENT PLANT?

A. STRUCTURAL ☒ YES ☒ NO (If yes, explain)

leaky digester

B. MECHANICAL ☐ YES ☒ NO (If yes, explain)

C. OPERATIONAL ☐ YES ☒ NO (If yes, explain)

D. BASED ON OPERATING EXPERIENCE TO DATE WHAT IF ANY CHANGES WOULD YOU RECOMMEND TO IMPROVE OPERATION OF THE PLANT?

5. ARE OPERATING RECORDS MAINTAINED? (If maintained, check general items included)						REPORTED? TO WHOM?					
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO						<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO					
FREQUENCY	WEATHER	FLOW	SLUDGE HANDLED	CHEMICALS USED	DIGESTER	GRIT HANDLED	ELEC. USED	COST DATA	AIR USED	MAINTENANCE	OTHER
DAILY	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
WEEKLY											
MONTHLY											
ANNUALLY											

6. ARE LABORATORY RECORDS MAINTAINED? (check appropriate box)

☐ NOT AT ALL ☒ DAILY ☐ WEEKLY ☐ MONTHLY ☐ ANNUALLY

IF MAINTAINED CHECK FORM OF RECORD BELOW:

☐ LOG BOOK ☒ TABULAR SHEET ☐ SEPARATE BY OPERATION ☐ CONTROL CHARTS ☐ GRAPHS

WHAT PLANT AND/OR LABORATORY EQUIPMENT, GAGES AND METERS ARE CALIBRATED PERIODICALLY?

7. IS LABORATORY TESTING ADEQUATE FOR THE CONTROL REQUIRED FOR THIS SIZE AND TYPE OF PLANT?

☒ YES ☐ NO (If no, explain)

B. INDUSTRIAL WASTES DISCHARGED TO MUNICIPAL SYSTEM: NO

A. NUMBER AND TYPES OF INDUSTRIES DISCHARGING TO SYSTEMS

B. POPULATION EQUIVALENT (BOD) OF INDUSTRIAL WASTES (pc)

C. POPULATION EQUIVALENT (SS) OF INDUSTRIAL WASTES (pc)

D. VOLUME OF INDUSTRIAL WASTES (mgd)

E. COMPOSITION AND CHARACTERISTICS OF INDUSTRIAL WASTES

F. MAIN DIFFICULTY EXPERIENCED WITH INDUSTRIAL WASTE (explain)

G. HAVE INDUSTRIAL EFFLUENT PROBLEMS BEEN SOLVED?

☐ YES ☐ NO (If yes, how?)

9A. METHOD OR METHODS USED TO ASSESS INDUSTRIAL WASTE TREATMENT COST (check appropriate box)

☐ NO CHARGE BY CITY ☐ PROPERTY TAX ☐ WATER USE ASSESSMENT ☐ CHARGE BASED ON FLOW
☐ CHARGED BASED ON BOD ☐ CHARGE BASED ON SS ☐ OTHER METHODS (describe)

COMMENT ON HOW CHARGE IS COLLECTED (fixed charge, sliding scale, etc.)

9B. IS INDUSTRIAL WASTE ORDINANCE IN EFFECT AND ENFORCED? ☐ YES ☐ NO

10. WHO PROVIDED INITIAL INSTRUCTION IN THE OPERATION OF THE PLANT?

Consulting Engineers

Rader - Leonard + Associates

11. IS A MANUAL OF PRACTICE OR INSTRUCTIONS AVAILABLE?

☒ YES ☐ NO

IF YES, WHO WROTE AND PROVIDED IT?

State of Washington

12. ESTIMATE OF MAN-HOURS PER WEEK DEVOTED TO LABORATORY WORK AND MAINTENANCE OF RECORDS AND REPORTS

20

D. PLANT PERSONNEL (Annual Average Staff for Most Recent Year Reported in Section "F")

JOB CATEGORY	NUMBER	TOTAL MAN-HOURS PER WEEK	TOTAL NUMBER CERTIFIED OR LICENSED	RANGE IN YEARS EMPLOYED AT PRESENT PLANT	RANGE IN YEARS OF EXPERIENCE IN TREATMENT
1. SUPERINTENDENT					
2. OPERATORS	<u>2</u>	<u>50</u>	<u>1</u>	<u>1</u>	<u>3</u>
3. LABORATORY TECHNICIANS					
4. LABORERS					
5. PART-TIME LABORERS					
6. TOTAL					

E. LABORATORY CONTROL

Enter test codes opposite appropriate items. If any of the below tests are used to monitor industrial wastes place an "X" in addition to the test code.

CODES

1 - 7 or more per week 3 - 1, 2, or 3 per week 5 - 2 or 3 per month 7 - Quarterly 9 - Annually
2 - 4, 5 or 6 per week 4 - as required 6 - 1 per month 8 - Semi-Annually

ITEM	RAW	PRIMARY EFFLUENT	Filter Effluent	FINAL	SLUDGE		DIGESTOR	RECEIVING AREA
					RAW	SUPER-NATANT		
1. BOD								
2. SUSPENDED SOLIDS								
3. SETTLEABLE SOLIDS	1	1	1	1				
4. SUSPENDED VOLATILE								
5. DISSOLVED OXYGEN								
6. TOTAL SOLIDS								
7. VOLATILE SOLIDS								
8. pH	1	1	1	1			3	
9. TEMPERATURE	1						1	
10. COLIFORM DENSITY								
11. RESIDUAL CHLORINE				1				
12. VOLATILE ACIDS							3	
13. M. B. STABILITY								
14. ALKALINITY							3	
15.								
16.								
17.								
18.								
19.								

F. OPERATION AND MAINTENANCE COST FOR PLANT

YEAR OF OPERATION	SALARIES/WAGES	ELECTRICITY	CHEMICALS	MAINTENANCE	OTHER ITEMS	TOTAL
MOST CURRENT YEAR 19						
PRIOR YEAR 19						
PRIOR YEAR 19						
PRIOR YEAR 19						

EVALUATION PERFORMED BY	TITLE	ORGANIZATION
Patrick M. Lee	E. II	DOE

INFORMATION FURNISHED BY	TITLE	ORGANIZATION	DATE
Jacob Van Patten	Operator	City of Burlington	1/4/74